

Research ID	Title	Description	Council / SSC Priority	Current CPT Priority	Updated CPT Priority	Current Research Status	Updated Research Status	Notes
145	Continuation of State and Federal annual and biennial surveys	Continuation of State and Federal annual and biennial surveys in the GOA, AI, and EBS, including crab pot surveys, is a critical aspect of fishery management off Alaska. It is important to give priority to these surveys, in light of recent federal budgets in which funding may not be sufficient to conduct these surveys. Loss of funding for days at sea for NOAA ships jeopardizes these programs. Budgetary concerns have resulted in cuts to not only days at sea, which increases uncertainty, but also sampling the deepest strata, which threatens the value of trawl surveys as a synoptic ecological survey. These surveys provide baseline distribution, abundance, and life history data that form the foundation for stock assessments and the development of ecosystem approaches to management. Although an ongoing need, these surveys are considered the highest priority research activity, contributing to assessment of commercial groundfish and crab fisheries off Alaska.	C.O.M	C.O.M.		Underway		
190	Collect and maintain time series of ocean pH	Collect and maintain time series of ocean pH in the major water masses off Alaska to improve understanding of ocean acidification and its effects on managed species, upper level predators and lower trophic levels	C.O.M	C.O.M.		Underway	Partially underway; some moorings removed; less data on	
241	Develop bottom and water column temperature database and indices	Develop bottom and water column temperature database and indices for use in EBS, GOA, and AI stock assessments.	Important	C.O.M.		Partially underway		
147	Life history research on data poor or non-recovering crab stocks	Why certain stocks have declined and failed to recover as anticipated is a pressing issue (e.g., Pribilof Island blue king crab, Adak red king crab). Research into all life history components, including predation by groundfish on juvenile crab in nearshore areas, is needed to identify population bottlenecks, an aspect that is critically needed to develop and implement rebuilding plans.	Important	Urgent	important	No action	partially underway	
178	Develop a framework <b>and collect</b> economic information	Develop a framework <b>and collect</b> economic information on commercial, recreational, and charter fishing, as well as fish processing, to meet the requirements of the MSFCMA sections 303(a)(5, 9, 13), 303(b)(6), and 303A.	Urgent	Urgent		Partially underway		
235	Investigate gear modifications and changes in fishing practices to reduce bycatch and PSC	Gear modifications and changes in fishing practices to reduce bycatch and PSC are needed.	Urgent	Urgent		Partially underway		
367	Continue to improve stock assessment methodology with respect to uncertainty	Recent studies have made advances in determining effective sample size, effective number of parameters, Bayesian parameterizations, and how to weight datasets in assessments with multiple datasets. <b>Introduce methodology to identify additional sources of uncertainty</b> However, results appear to vary from paper to paper, and no general rules have emerged. Thus, our ability to characterize uncertainty remains elusive.	Urgent	Urgent		Underway		
148	Spatial distribution and movement of crabs-relative to life history events and fishing	<b>There is a need to characterize the spatial distribution and movement of crab stocks.</b> For example, information is needed to understand the distribution of male/female snow crab at time of mating, a better understanding of spatial stock dynamics and population connectivity for Tanner Crab east and west of 166, and to understand the distribution and movement of golden king crab in the Aleutian Islands in areas historically fished and not fished. <b>There is a need to characterize</b>	Urgent	Urgent		Partially underway		
167	Alternative approaches to acquire fishery-independent abundance data for unsurveyed crab stocks <b>(remove rest)</b> of golden king crab	Explore alternative approaches to the triennial ADF&G Aleutian Islands golden king crab pot survey to acquire fishery-independent abundance data on stock distribution and recruitment of <b>unsurveyed crab stocks</b> (e.g., Aleutian Islands golden king crab, including the potential for future cooperative research efforts with Industry).	Urgent	Urgent		Underway	partially underway	

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531	Collect growth data for Bering Sea crab stocks	Collect stock specific growth data for Bering Sea crab stocks that are currently managed using inadequate sample size data. Pending feedback from PT	Urgent	Urgent		Partially underway		
226	Continue to evaluate the socio-economic effects from fishery policy changes on coastal communities.	Continue to evaluate the socio-economic effects from fishery policy changes on coastal communities. This includes understanding socio-economic impacts (both direct and indirect) and how the impacts are distributed among communities and economic sectors.	C.O.M	Important		Partially underway		
431	Develop tools for analyzing coastal community vulnerability to fisheries management changes	Develop tools for for assessing and predicting coastal community vulnerability to fisheries management changes. Assess changes in community vulnerability over time by FMP and individual catch share fishery.	Important	Important		Underway		
251	Modeling studies of ecosystem productivity	Modeling studies of ecosystem productivity in different regions (EBS, GOA, and AI). For example, studies could evaluate the appropriateness of the 2 million t OY cap.	Important	Important		Underway		
149	Improve handling mortality rate estimates for crab	Continue to improve estimate of discarded crab handling mortality rate for crab species. Empirical data exist for snow and Tanner so new handling mortality data are needed for Tanner and king crab by size, sex, and fishery type with consideration of temperature. Methodology needed for king crab. This will require improving understanding of the post-release mortality rate of discarded crab from directed and non-directed crab pot fisheries and principal groundfish (trawl, pot, and hook and line) fisheries. The magnitude of post-release mortality is an essential parameter in the determination of the overfishing level used to evaluate overfishing in stock assessment and projection modeling. Current priorities are to assess handling mortality in long-line fisheries and for long term mortality studies.	Important	Important	strategic	Partially underway	partially completed	add rationale as to why this is still relevant but has been completed satisfactorily To address pressing assessment concerns
164	Effects of trawling on female red king-crab and subsequent recruitment	Research is needed on the effects of trawling on the distribution of breeding and ovigerous female red king crab and subsequent recruitment. Relevant studies include 1) assessing the efficacy of the current Red King Crab Savings Area Boundaries, and 2) assessing effects of potential habitat modifications on the distribution of females, particularly in nearshore areas of southwest Bristol Bay, and environmental effects (e.g., trawling overlap in warm vs. cold years), 3) quantification of unobserved mortality (e.g. pelagic trawl gear contacting bottom). Retrospective studies, the identification of larval release locations, and larval advection using Regional Ocean Modeling System would help address this need.	Important	Important		Underway		
169	Studies on factors that affect catchability particularly for King and Snow and Tanner crab	For groundfish and crabs, studies are needed on factors that affect catchability, as they directly bear on estimates of the stock assessment. Research to refine the estimates of survey catchability, q, used to infer absolute, rather than relative, abundance would substantially improve the quality of management advice. Particular emphasis should be placed on Tanner crab and Red King Crab because of recent trends in stock status, and-on-fishery and for Aleutian Island golden king crab to improve the stock assessment model.	Important	Important		Underway		
532	Natural mortality estimation for crab stocks	Investigate natural mortality for crab stocks, to include responses to environmental variability and predation. Compare to existing natural mortality parameters used in stock assessment modeling.	Important	Important		No action		
238	Develop a GIS relational database for habitat, to include a historical time series of the spatial intensity of interactions between commercial fisheries and habitat.	Develop a GIS relational database for habitat, including development of a historical time series of the spatial intensity of interactions between commercial fisheries and habitat. Such time series are needed to evaluate the impacts of changes in fishing effort and type on EFH.	Strategic	Important	strategic	Underway		Largely completed in conjunction with EFH analyses

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191	Assess whether changes in pH and temperature would affect managed species, upper level predators, and lower trophic levels.	Assess whether changes in pH and temperature would affect managed species, upper level predators, and lower trophic levels. Laboratory studies are needed to assess the synergistic effects of ocean acidification and changes in temperature on productivity of marine species.	Strategic	Important	strategic	Partially underway		likely to fall outside of a 5 year time frame for incorporation into assessment and management
202	Methods for reliable estimation of total removals	Develop methods for reliable estimation of total removals (e.g., surveys, poorly observed fisheries) to meet requirements of total removals under ACLs. Catch Accounting System now provides total removals annually. Improved reporting on some data such as subsistence catches and Pacific cod bait in crab fisheries is needed. Improvements are needed for <b>in-season</b> catch accounting by sex and size for crab in non-directed fisheries with high bycatch or PSC rates, particularly for blue king crab in the Pacific cod pot fishery in the Pribilof Islands.	Urgent	Important	strike	Underway		For crab the issues have been largely resolved.
232	Develop management strategy evaluations that incorporate changing climate and market economic conditions and impacts to coastal communities.	Develop management strategy evaluations under differing assumptions regarding climate and economic conditions. Promote the standardization of future scenarios from different models to promote comparability of model outputs.	Urgent	Important		Underway		
163	Conduct routine fish, crab, and oceanographic surveys in the northern Bering Sea and Arctic Ocean	Dynamic ecosystem and environmental changes in the northern Bering Sea and Arctic are occurring. Assessment of the current baseline conditions and trophic interactions is important. This effort should not supplant the regular surveys in the BSAI and GOA, which are of critical importance to science and management.	Urgent	Important		Partially underway		
179	Conduct pre- and post-implementation studies of the benefits and costs, and their distribution, associated with dedicated access privileges	Conduct pre- and post-implementation studies of the benefits and costs, and their distribution, associated with changes in management regimes (e.g., changes in product markets, characteristics of quota share markets, changes in distribution of ownership, changes in crew compensation) as a consequence of the introduction of dedicated access privileges in the halibut/sablefish, AFA pollock, and crab fisheries. Benefits and costs include both economic and social dimensions.	Urgent	Important		Partially underway		
170	Quantitative reproductive index for the surveyed BSAI crab stocks	Advance research towards developing a quantitative reproductive index for BSAI crab stocks. Research on mating, fecundity, fertilization rates, and, for snow and Tanner crab, sperm reserves and biennial spawning, is needed to develop annual indices of fertilized egg production that can be incorporated into the stock assessment process and to model the effects of sex ratios, stock distribution, and environmental change on stock productivity. Priority stocks for study are eastern Bering Sea snow and Tanner crab and Bristol Bay red king crab.	Urgent	Important		Underway		
173	Expand studies to identify stock and management boundaries	To identify and refine stock boundaries and understand source/sink dynamics (e.g., scallop metapopulations). Conduct studies to evaluate all crab stock boundaries relative to management boundaries (e.g., Bristol Bay red king crab, Adak red king crab, <b>Aleutian Island golden king crab</b> , <b>EBS Tanner crab</b> , Pribilof blue king crab). Expanded studies are needed in the areas of genetics, mark-recapture, reproductive biology, larval distribution, and advection. Such boundaries are to be evaluated so that the risks and consequences of management actions are clear.	Urgent	Important		Partially underway		
186	Collect and maintain zooplankton and meroplankton biomass and community composition time series	Collect and maintain zooplankton and meroplankton biomass and community composition time series in the eastern Bering Sea. Develop, collect and maintain time series of zooplankton biomass and community composition for the GOA, AI, Arctic.	C.O.M	Strategic		Partially underway		

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150	Maintain the core biological and oceanographic data (e.g., biophysical moorings, stomach data, zooplankton, age 0 surveys) necessary to support integrated ecosystem assessment	Maintain the core data and process studies needed to support integrated ecosystem assessments. Core data include inputs for single- or multi-species management strategy evaluations, food web, and coupled biophysical end-to-end ecosystem models (e.g. biophysical moorings, stomach data, zooplankton, age 0 surveys (i.e. BASIS surveys)). Develop and maintain indices of sea ice formation, sea ice retreat, and timing/extent of the spring bloom for the EBS. For this, maintenance of moorings, especially M-2, is essential. If recent changes in ice cover and temperatures in the Bering Sea persist, these may have profound effects on marine communities.	C.O.M	Strategic		Underway		
183	Research the role of habitat in population dynamics and ecosystem processes	Research is needed on the role of habitat in population dynamics and ecosystem processes. Specifically, studies are needed to evaluate how habitat-forming species (e.g., corals) influence life history parameters (e.g., mortality, growth, movement) of FMP species and their preferred prey. Such research will identify key habitats (including essential fish habitat and habitat areas of particular concern), improve the design and management of marine protected areas, and ultimately improve stock assessments and restoration efforts.	Important	Strategic		Partially underway		
184	Evaluate efficacy of habitat closure areas and habitat recovery	Establish a scientific research and monitoring program to understand the degree to which impacts on habitat, benthic infauna, etc., have been reduced within habitat closure areas, and to understand how benthic habitat recovery of key species is occurring (e.g., Red King Crab Savings Area efficacy and Pribilof Island Habitat Conservation Area). (This is an objective of EFH research approach for the Council FMPs).	Important	Strategic	important	Partially underway		
220	Research on survey analysis techniques for species that exhibit patchy distributions	Continue research on the design and implementation of appropriate survey analysis techniques, to aid the Council in assessing species (e.g., Pribilof Island king crabs and rockfish) that exhibit patchy distributions and, thus, may not be adequately represented (either over- or under-estimated) in the annual or biennial groundfish surveys.	Important	Strategic	important	Partially underway		
237	Improved habitat maps	Improved habitat maps (especially benthic habitats) are required to identify essential fish habitat and distributions of various substrates and habitat types, including habitat-forming biota, infauna, and epifauna in the GOA, BS, and Aleutian Islands.	Important	Strategic		Underway		
240	Develop a multivariate index of the climate forcing of the Bering Sea shelf	Develop a multivariate index of the climate forcing of the Bering Sea shelf. Three biologically significant avenues for climate index predictions include advection, setup for primary production, and partitioning of habitat with oceanographic fronts and temperature preferences.	Important	Strategic	important	Partially underway		
250	Conduct ecosystem structure studies	Studies are needed to evaluate the effects of global warming, ocean acidification, and selective fishing on food webs. For instance, studies are needed to evaluate differential exploitation of some components of the ecosystem (e.g., Pacific cod, pollock, and crab) relative to others (e.g., arrowtooth flounder).	Important	Strategic		Partially underway		
158	Research ecosystem indicators and their thresholds for inclusion in ecosystem-level management strategy evaluation.	Initiate/continue research on the synthesis of ecosystem indicators, developing and evaluating thresholds for ecosystem indicators, and ecosystem-level management strategy evaluation.	Important	Strategic		Partially underway		

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194	Identification and integration of archived data	Identification and recovery of archived data (e.g., historical agency groundfish and shellfish surveys, <b>and fishery data</b> ) should be pursued. Investigate integrating these data into stock and ecosystem assessments. Some archival acoustic data have been cataloged, and most trawl surveys have been included in databases. Some one-time research surveys remain neglected.	Strategic	Strategic		Partially underway		
223	Develop and evaluate global climate change models (GCM) or downscaled climate variability scenarios to assess impacts to recruitment, growth, and spatial distributions.	Quantify the effects of historical climate variability and climate change on recruitment, growth, and spatial distribution. Develop standard environmental scenarios (e.g., from GCMs) for present and future variability based on observed patterns.	Strategic	Strategic		Partially underway		
196	<b>Genetics, population dynamics, and management implications of hybridization between Tanner and snow crabs in the Bering Sea</b>	<b>The presence of hybrids complicates the assessment and management of EBS snow and Tanner crab stocks. Genetics research is needed to better understand the abundance of hybrids relative to pure snow and Tanner crabs. Other needed research includes environmental shifts to hybrid crab coastal distribution, the</b>	Strategic	Strategic	important	Partially underway		
225	Development of projection models to evaluate management strategies under varying environmental and ecological conditions.	There is a need for the development of projection models to evaluate the robustness and resilience of different management strategies under varying environmental and ecological conditions. Projection models are also needed to forecast seasonal and climate related shifts in the spatial distribution and abundance of commercial fish and shellfish.	Strategic	Strategic		Partially underway		<b>how is this different from 158? Consider merging</b>
233	Develop an ongoing database of product inventories	Development of an ongoing database of product inventories (and trade volume and prices) for principal shellfish, groundfish, Pacific halibut, and salmon harvested by U.S. fisheries in the North Pacific and eastern Bering Sea.	Strategic	Strategic		No action		
234	Analyze current determinants of demand for principal seafood products	Analyze current determinants of ex vessel, wholesale, international, and retail demand for principal seafood products from the GOA and BSAI.	Strategic	Strategic		Partially underway		
242	Collect and maintain primary production time series	Collect and maintain primary production time series in the EBS, AI, GOA, and Arctic; particularly in relationship to key climate and oceanographic variables.	Strategic	Strategic		Partially underway		
224	Climate and oceanographic information covering a wider range of seasons	There is a need for climate and oceanographic information that covers a wider range of seasons than is presently available.	Strategic	Strategic		Partially underway		
177	Conduct prospective and retrospective analyses of changes in the spatial and temporal distribution of fishing effort in response to management <b>and environmental changes</b>	Conduct prospective and retrospective analyses of changes in the spatial and temporal distribution of fishing effort, in response to management actions (e.g., time/area closures, marine reserves, PSC and other bycatch restrictions, co-ops, IFOs, <b>multi-target crab fisheries</b> ) and environmental changes.	Strategic	Strategic		Partially underway		<b>note add as new priority if this cannot be broadened to include environmental changes on fishing effort</b>
165	Conduct routine surveys of subsistence in the northern Bering Sea and Arctic Ocean	Conduct routine surveys of subsistence use of marine resources in the northern Bering Sea and Arctic Ocean. These surveys will become increasingly important under ongoing warming ocean temperatures because range expansions of harvested fishery resources may occur. If range expansions or shifts occur, data will be needed to adjust standard survey time series for availability.	Urgent	Strategic		Partially underway		

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174	Develop spatially explicit stock assessment models	Develop spatially explicit stock assessment models. High priority species for spatially explicit models include: walleye pollock, snow and Tanner crab, Pacific cod, sablefish, yellowfin sole, rock sole, arrowtooth flounder, Pacific ocean perch, black spotted rockfish, rougheye rockfish, and Atka mackerel.	Urgent	Strategic	important	No action	partially underway	
197	Develop methodologies to monitor for new/emerging diseases and/or parasites among exploited species and higher trophic levels	Develop methodologies to monitor for new/emerging diseases and/or parasites among exploited species and higher trophic levels.	Urgent	Strategic		No action	partially underway	selected index monitoring
172	Develop and validate aging methods for crabs.	Develop and validate aging methods for crabs to improve estimates of M for stock assessments.	Urgent	Strategic	important	Underway		
208	Research on stock- recruit relationships	New information and data are needed that would inform our understanding of the stock- recruit relationship for groundfish, Pacific halibut, and crab to project year-class strength.	Urgent	Strategic		Underway		
229	Evaluate the effectiveness of setting ABC and OFL levels for data-poor crab stocks	Evaluate the effectiveness (e.g., potential for overharvest or unnecessarily limiting other fisheries) of setting ABC and OFL levels for data-poor stocks (Tiers 4 and 5 for crab).	Urgent	Strategic	strike	Partially underway		carry-over from Crab ACL analysis
554	Molt and mate timing for Norton Sound red king crab	Within the assessment, there are conflicting observations about molt timing in April/May versus August/September. Moreover these observations suggest the potential for biennial mating. These issues could have important consequences on the assessment model.	Important	Pending	important	No action	partially underway	
New	Development of a common assessment modeling platform for Bering Sea crab assessments	Gmacs (Generalized Modeling for Alaskan Crab Stocks) is a statistical size-structured population modeling framework. It is designed to be flexible, scalable, and useful for both data-limited and data-rich situations. GMACS is intended to be the primary modeling platform used to conduct assessments of all crab stocks in the Bering Sea.	Pending	n/a	C.O.M.			
New	Maturity estimates for Bering Sea and Aleutian Island crab stocks	Application of Tier 3 control rules for crab requires reliable estimates of maturity to determine mature biomass. Maturity estimates of BSAI crab stocks are, in many cases, based on old studies using outdated methods. New studies to estimate both male and female maturity curves are needed for several stocks, with Aleutian	Pending	n/a	Important			
New	Develop collections for the core biological and oceanographic data (e.g., biophysical moorings, benthic production, larval surveys) necessary to	Support collection of the core data and process studies needed to support integrated ecosystem assessments on spatial and temporal scales relevant to crab stocks. Core data include inputs for single- or multi-species management strategy evaluations, food web, and coupled biophysical end-to-end ecosystem models (e.g.	Pending		Important	No action		
New	Effects of trawling and other anthropogenic benthic-contact activities on crab habitat	The effects on habitat, and subsequent risks to growth and survival of the crab stocks that utilize those habitats, from trawling and other anthropogenic activities that impact the benthos need to be quantified in terms of scale and severity of immediate impact, as well as chronic effects and potential for recovery.	Pending	important				